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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,803	11/20/2002	Chun-Jen Weng	JCLA9605	6568

23900 7590 09/23/2003

J C PATENTS, INC.
4 VENTURE, SUITE 250
IRVINE, CA 92618

EXAMINER
ESTRADA, MICHELLE

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 09/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/065,803	Applicant(s) WENG ET AL.	
	Examiner Michelle Estrada	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disp sition of Claims

4)☒ Claim(s) *1,3-10 and 12-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10 and 12-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2 and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Ho et al. (6,184,138).

Ho et al. disclose providing a substrate (10) having a dielectric layer (16) thereon, wherein the dielectric layer has an opening (12) therein forming a gap-filling material layer (24) over the dielectric layer and inside the opening (See fig. 3a); removing a portion of the gap-filling material from the gap-filling material layer to expose the dielectric layer (16/18); and conducting a gap-filling material treatment on the gap-filling material layer and the dielectric (Col. 6, lines 35-40); wherein the gap-filling material treatment includes etching the dielectric layer and the gap-filling material by chemical-mechanical polishing to remove a portion of the dielectric layer and the gap-filling material layer and hence planarizing the gap-filling material layer; wherein the gap-filling material treatment includes forming a protective layer (30) over the gap-filling material layer; wherein the material constituting the gap-filling material layer is a bottom anti-reflection coating; wherein the step of forming the gap-filling material layer includes spin coating (Col. 6, lines 12-20); wherein after the step of treating the gap-filling material on the gap-filling material layer and the dielectric layer, further includes forming a bottom

anti-reflection coating (30) over the gap-filling material layer and the dielectric layer; wherein the opening is a dual damascene opening.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al. as applied to claims 1, 2 and 5-9 above, and further in view of Mandal (6,541,367).

Ho et al. do not disclose forming the protective layer by a plasma treatment.

Mandal discloses providing a substrate (504) having a dielectric layer (510/514) thereon, wherein the dielectric layer has an opening (520) therein forming a gap-filling material layer (524) over the dielectric layer and inside the opening (See fig. 8G); removing a portion of the gap-filling material from the gap-filling material layer to expose the dielectric layer (516); and conducting a gap-filling material treatment on the gap-filling material layer; forming a protective layer (518) over the resultant structure by a plasma treatment (Col. 10, lines 9-10).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Ho et al. and Mandal to enable formation of the protective layer.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 10-14 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Mandal (6,541,367).

Mandal discloses providing a substrate (504); sequentially forming a protective layer (508), a first dielectric layer (510), an etching stop layer (512), a second dielectric layer (514) and a cap layer (516/517) over the substrate; forming a via opening (520) passing through the first dielectric layer, the etching stop layer, the second dielectric layer and the cap layer (See fig. 8E); forming a gap-filling material layer (524) over the cap layer and inside the via opening; removing a portion of the gap-filling material from the gap-filling material layer to expose the cap layer; and conducting a gap-filling material treatment on the gap-filling material layer and the cap layer (Col. 17, lines 30-55 and fig. 8H); wherein the gap-filling material treatment includes etching the cap layer and the gap-filling material layer to remove a portion of the cap layer and the gap-filling material layer and hence planarizing the gap-filling material layer; wherein the gap-filling material treatment includes forming a protective layer (518) over the gap-filling material layer by conducting a plasma treatment; wherein steps for treating the gap-filling material includes: etching the cap layer and the gap-filling material layer; and forming a protective layer over the gap-filling material layer by conducting a plasma treatment; wherein the step of removing a portion of the gap-filling material from the gap-filling

material layer includes chemical-mechanical polishing; wherein after the step of treating the gap-filling material on the gap-filling material layer and the cap layer, further includes forming a bottom anti-reflection coating (518) over the gap-filling material layer and the dielectric layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandal as applied to claims 10-14 and 17 above, and further in view of Ho et al.

Mandal does not disclose wherein the step of forming the gap-filling material layer includes spin coating; and wherein material constituting the gap-filling material layer is a bottom anti-reflection coating.

Ho et al. disclose forming a gap-filling material constituting a bottom anti-reflection material and spin coating the material (Col. 6, lines 12-20).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Mandal and Ho et al. to enable formation of the gap-filling material and further the spin on material protects the inside surfaces of the dual damascene structure during subsequent processing steps (Col. 6, lines 18-20).

Response to Arguments

Applicant's arguments filed 7/2/03 have been fully considered but they are not persuasive. Applicant argues that the protective layer of the present invention is formed on the exposed surface of the gap-filling material layer but no over the entire surface of the substrate. However, the claims are not so limited.

Applicant argues that Mandal discloses a protective layer formed over the entire substrate too. However, the protective layer of Mandal is encompassed by the instant claims.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

George Fourson
Primary Examiner
Art Unit 2823

MEstrada
September 8, 2003